

In re Patent Application of:

SHEARON ET AL

Serial No. 10/757,041

Filed: 01/14/2004

IN THE CLAIMS:

1. (original) A soft start circuit for a power supply comprising:

an input port which is adapted to be coupled to said power supply;

an output port from which a soft start output voltage is to be provided;

a start-up voltage generator adapted to be coupled to said input port;

a controlled output power circuit device coupled to said output port;

an operational amplifier having an output coupled to said controlled output power circuit device, a first input coupled to receive a first prescribed reference voltage, and a second input coupled to monitor said output port; and

a comparator having an output coupled to said start-up voltage generator, a first input coupled to receive a second prescribed reference voltage less than said first prescribed reference voltage, and a second input coupled to monitor said output port, and wherein said comparator is operative, in response to the voltage at said output port exceeding said second prescribed reference voltage, to enable said start-up voltage generator to apply a start-up voltage signal to said first input of said operational amplifier, whereupon said operational amplifier drives said output port with a soft start voltage corresponding to said start-up voltage signal.

2. (original) The soft start circuit according to claim 1, wherein said comparator is operative, in response to the voltage at said output port not exceeding said second prescribed reference voltage, to prevent said start-up voltage generator from applying a start-up voltage signal to said first input of said operational amplifier.

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3. (original) The soft start circuit according to claim 1, wherein said start-up voltage generator comprises a capacitor and an input current generator coupled thereto.

4. (original) The soft start circuit according to claim 3, wherein said start-up voltage generator further includes a comparator-controlled discharge switch coupled with said capacitor and being operative, in response to the voltage at said output port not exceeding said second prescribed reference voltage, to prevent said capacitor from being charged by said input current generator coupled thereto.

5. (original) A soft start circuit architecture for generating a plurality of soft start voltages for application to associated power supply terminals of a power supply system, comprising a plurality of soft start circuits, each respective one of which is operative to controllably generate a soft start voltage waveform in response to a controlled power output device thereof being brought to a prescribed state of operation, and a control circuit which is operative to prevent any of said soft start circuits from generating a soft start voltage waveform until all of said controlled power output devices of said plurality of soft start circuits have been brought to said prescribed state of operation.

6. (original) The soft start circuit architecture according to claim 5, wherein a respective one of said plurality of soft start circuits comprises:

an input port which is adapted to be coupled to a power supply;

an output port from which a soft start output voltage is to be provided;

a start-up voltage generator adapted to be coupled to said

input port;

a controlled output power circuit device coupled to said output port;

an operational amplifier having an output coupled to said controlled output power circuit device, a first input coupled to receive a first prescribed reference voltage, and a second input coupled to monitor said output port; and

a comparator having an output coupled to said start-up voltage generator, a first input coupled to receive a second prescribed reference voltage less than said first prescribed reference voltage, and a second input coupled to monitor said output port, and wherein said comparator is operative, in response to the voltage at said output port exceeding said second prescribed reference voltage, to enable said start-up voltage generator to apply a start-up voltage signal to said first input of said operational amplifier, whereupon said operational amplifier drives said output port with a soft start voltage corresponding to said start-up voltage signal; and wherein

said control circuit is operative, in response to the voltage at the output port of any of said soft start circuits not exceeding said second prescribed reference voltage, to prevent the start-up voltage generators of all of said soft start circuits from applying start-up voltage signals to first inputs of their operational amplifiers.

7. (original) The soft start circuit architecture according to claim 6, wherein said start-up voltage generator comprises a capacitor and an input current generator coupled thereto.

8. (original) The soft start circuit architecture according to claim 7, wherein said start-up voltage generator further includes a comparator-controlled discharge switch coupled with said capacitor and being operative, in response to the voltage at said output port not exceeding said second prescribed reference

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voltage, to prevent said capacitor from being charged by said input current generator coupled thereto.

9. (original) A soft start circuit for a power supply comprising:

an input port which is adapted to be coupled to said power supply and to which a capacitor is coupled;

a current source for controllably charging said capacitor;

a controlled switch coupled to said input port and being controllably operative to maintain said capacitor in a discharged state for a first condition of said soft start circuit, but to allow said capacitor to charge and thereby generate a soft start voltage for a second condition of said soft start circuit;

an output port from which a soft start output voltage is to be provided;

a controlled output power circuit device coupled to said output port;

an operational amplifier having an output coupled to said controlled output power circuit device, a first input coupled to receive a first prescribed reference voltage, and a second input coupled to monitor said output port; and

a comparator having an output coupled to said controlled switch, a first input coupled to receive a second prescribed reference voltage less than said first prescribed reference voltage, and a second input coupled to monitor said output port, and wherein said comparator is operative, in response to the voltage at said output port not exceeding said second prescribed reference voltage corresponding to said first condition of said soft start circuit, to cause said switch to maintain said capacitor in a discharged state and thereby prevent a soft start voltage from being generated thereby and, in response to the voltage at said output port exceeding said second prescribed reference voltage corresponding to said second condition of said soft start circuit, to allow said capacitor to charge and thereby

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generate said soft start voltage.

10. (original) The soft start circuit according to claim 9, wherein said first prescribed reference voltage corresponds to the product of current generated by said current source and a reference resistor coupled to said first input of said operational amplifier.

11. (original) The soft start circuit according to claim 9, wherein said first prescribed reference voltage corresponds to the product of a current generated by a further current source and a reference resistor coupled to said first input of said operational amplifier.

12. (original) The soft start circuit according to claim 11, wherein said comparator includes a current mirror having an input coupled to said output port, and wherein an output of said current mirror is coupled to said second input of said operational amplifier.

13. (new) A soft start circuit according to claim 1, wherein said operational amplifier is operative to cause said controlled output power circuit device to replicate said soft start voltage signal at said output port.

14. (new) The soft start circuit architecture according to claim 6, wherein said operational amplifier is operative to cause said controlled output power circuit device to replicate said soft start voltage signal at said output port.

15. (new) The soft start circuit according to claim 9, wherein said operational amplifier is operative to cause said controlled output power circuit device to replicate said soft start voltage at said output port.

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16. (new) The soft start circuit according to claim 4, wherein said comparator-controlled discharge switch has an input terminal coupled to said input port, an output terminal coupled to receive a reference potential, and a control terminal coupled to the output of said comparator.

17. (new) The soft start circuit architecture according to claim 8, wherein said comparator-controlled discharge switch has an input terminal coupled to said comparator, an output terminal coupled to receive a reference potential, and a control terminal coupled to the output of said comparator.

18. (new) The soft start circuit according to claim 9, wherein said controlled switch has an input terminal coupled to said input port, an output terminal coupled to receive a reference potential, and a control terminal coupled to the output of said comparator.